11/13/2026 Discrete Structures Quiz 8 Sitaraman

Howard University Math Department

Instructions:

PLEASE PROVIDE STEP BY STEP EXPLANATIONS

WRITING ONLY ANSWERS WILL NOT GET FULL CREDIT

Time Limit 30 minutes

Please read the questions carefully before answering

1. (15 points) This question is about the string of 0's and 1's in an 8 digit binary number, such as 10101010. For each of the following, you must explain your answer step by step.
   (a) How many of the numbers will have exactly three ones?
   (b) How many of the numbers will have at least two zeroes?
   (c) How many of the numbers will have at most one zero?

2. (a) (7 points) How many ways can you distribute 20 identical books in 3 different shelves?
   (b) (8 points) Same question as (a), except now instead of 20 identical books you have 8 copies of a math book, 5 copies of a physics book and 7 copies of a chemistry book, in the same shelf.

3. (Extra credit 10 points) How many ways to distribute 20 different books in 3 different shelves?